

WHAT IS CLAIMED IS:

1 1. A differential-to-single-ended (DSE) converter capable of
2 receiving a positive differential input signal and a negative
3 differential input signal and generating a single-ended output
4 signal, said DSE converter comprising:
5 a first comparator having a non-inverting input coupled
6 to said positive differential input signal and an inverting input
7 coupled to said negative differential input signal;
8 a second comparator having an inverting input coupled to
9 said positive differential input signal and a non-inverting input
10 coupled to said negative differential input signal;
11 a first D flip-flop having an input connected to Logic 1
12 and clocked by a rising edge on an output of said first comparator;
13 a second D flip-flop having an input connected to Logic 1
14 and clocked by a rising edge on an output of said second
15 comparator; and
16 a latch circuit having a first input coupled to an output
17 of said first D flip-flop and a second input coupled to an output
18 of said second D flip-flop, wherein a rising edge on an output of
19 said first D flip-flop causes an output of said latch to change
20 state and a rising edge on an output of said second D flip-flop
21 causes said latch output to change state.

1 2. The differential-to-single-ended (DSE) converter as set
2 forth in Claim 1, wherein said latch circuit comprises a first NOR
3 gate having a first input coupled to said output of said first D
4 flip-flop, a second input, and an output.

1 3. The differential-to-single-ended (DSE) converter as set
2 forth in Claim 2, wherein said latch circuit comprises a second NOR
3 gate having a first input coupled to said output of said second D
4 flip-flop, a second input coupled to said first NOR gate output,
5 and an output coupled to said second input of said first NOR gate.

1 4. The differential-to-single-ended (DSE) converter as set
2 forth in Claim 3, wherein said first NOR gate is coupled to said
3 first D flip-flop output by a first OR gate having a first input
4 coupled to said first D flip-flop output, a second input coupled to
5 Logic 0, and an output coupled to said first input of said first
6 NOR gate.

1 5. The differential-to-single-ended (DSE) converter as set
2 forth in Claim 4, wherein said first NOR gate output is coupled to
3 a reset input of said first D flip-flop.

1 6. The differential-to-single-ended (DSE) converter as set
2 forth in Claim 5, wherein said first NOR gate output is coupled to
3 said reset input of said first D flip-flop via a buffer circuit.

1 7. The differential-to-single-ended (DSE) converter as set
2 forth in Claim 4, wherein said second NOR gate output is coupled to
3 a reset input of said second D flip-flop.

1 8. The differential-to-single-ended (DSE) converter as set
2 forth in Claim 7, wherein said second NOR gate output is coupled to
3 said reset input of said second D flip-flop via a buffer circuit.

1 9. The differential-to-single-ended (DSE) converter as set
2 forth in Claim 1, wherein a speed of said first comparator is
3 determined by a biasing current of said first comparator and said
4 biasing current is adjustable to match a frequency of said positive
5 and negative differential input signals.

1 10. The differential-to-single-ended (DSE) converter as set
2 forth in Claim 1, wherein a speed of said second comparator is
3 determined by a biasing current of said second comparator and said
4 biasing current is adjustable to match a frequency of said positive
5 and negative differential input signals.

1 11. A phase-locked loop (PLL) circuit comprising:
2 a voltage-controlled oscillator capable of receiving a
3 control voltage and outputting a differential signal having a
4 frequency controlled by said control voltage, said voltage-
5 controlled oscillator comprising a ring oscillator containing a
6 chain of delay cells having differential inputs and differential
7 outputs;

8 a differential-to-single-ended (DSE) converter capable of
9 receiving a positive differential input signal and a negative
10 differential input signal from said voltage controlled oscillator
11 and generating a single-ended output signal, said DSE converter
12 comprising:

13 a first comparator having a non-inverting input
14 coupled to said positive differential input signal and an
15 inverting input coupled to said negative differential input
16 signal;

17 a second comparator having an inverting input
18 coupled to said positive differential input signal and a non-
19 inverting input coupled to said negative differential input
20 signal;

21 a first D flip-flop having an input connected to
22 Logic 1 and clocked by a rising edge on an output of said
23 first comparator;

24 a second D flip-flop having an input connected to
25 Logic 1 and clocked by a rising edge on an output of said
26 second comparator; and

27 a latch circuit having a first input coupled to an
28 output of said first D flip-flop and a second input coupled to
29 an output of said second D flip-flop, wherein a rising edge on
30 an output of said first D flip-flop causes an output of said
31 latch to change state and a rising edge on an output of said
32 second D flip-flop causes said latch output to change state.

1 12. The phase-locked loop (PLL) circuit as set forth in Claim
2 11, wherein said latch circuit comprises a first NOR gate having a
3 first input coupled to said output of said first D flip-flop, a
4 second input, and an output.

1 13. The phase-locked loop (PLL) circuit as set forth in Claim
2 12, wherein said latch circuit comprises a second NOR gate having a
3 first input coupled to said output of said second D flip-flop, a
4 second input coupled to said first NOR gate output, and an output
5 coupled to said second input of said first NOR gate.

1 14. The phase-locked loop (PLL) circuit as set forth in Claim
2 13, wherein said first NOR gate is coupled to said first D flip-
3 flop output by a first OR gate having a first input coupled to said
4 first D flip-flop output, a second input coupled to Logic 0, and an
5 output coupled to said first input of said first NOR gate.

1 15. The phase-locked loop (PLL) circuit as set forth in Claim
2 14, wherein said first NOR gate output is coupled to a reset input
3 of said first D flip-flop.

1 16. The phase-locked loop (PLL) circuit as set forth in Claim
2 15, wherein said first NOR gate output is coupled to said reset
3 input of said first D flip-flop via a buffer circuit.

1 17. The phase-locked loop (PLL) circuit as set forth in Claim
2 14, wherein said second NOR gate output is coupled to a reset input
3 of said second D flip-flop.

1 18. The phase-locked loop (PLL) circuit as set forth in Claim
2 15, wherein said second NOR gate output is coupled to said reset
3 input of said second D flip-flop via a buffer circuit.

1 19. The phase-locked loop (PLL) circuit as set forth in Claim
2 11, wherein a speed of said first comparator is determined by a
3 biasing current of said first comparator and said biasing current
4 is adjustable to match a frequency of said positive and negative
5 differential input signals.

1 20. The phase-locked loop (PLL) circuit as set forth in Claim
2 11, wherein a speed of said second comparator is determined by a
3 biasing current of said second comparator and said biasing current
4 is adjustable to match a frequency of said positive and negative
5 differential input signals.